

# RESERVE COPY

## PATENT SPECIFICATION



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358,992

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### COMPLETE SPECIFICATION.

#### Improvements in and relating to Accumulator Charging Apparatus.

I, PAUL WOLF, of 2, Schumann platz, Zwickau, Saxony, Germany, a German Citizen, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to an apparatus for charging accumulators of lamps, more particularly of electric head lamps for miners, which for the purpose of charging the accumulator connected with it permanently by a cable, has a rotatable contact spindle of insulating material, the ends of which, consisting of conducting material, are each connected with one pole of the accumulator when the contact spindle is in a given, usually locked, position and form the poles for the application of a charging current. With the same apparatus accumulators can also be charged which while not connected with lamps, have a contact device including a contact spindle suitable for use with the apparatus or are in any way connected with such a contact device other than a lamp. The invention has for its object a rapid and convenient charging of the accumulator. A further object is, in the case where the contact spindle is secured against unauthorised turning into the charging position by a locking device which is opened magnetically, to effect the unlocking by magnetic action, when the accumulator, or the accumulator with lamp, is connected with the charging apparatus, so that a special operation for unlocking is not required.

The charging apparatus according to the present invention may be applied to single accumulators with appropriate contact devices or lamps, but is preferably so constructed that a number of units each taking one accumulator, and contact device or lamp, are arranged in series so that the charging current passes through the whole series.

In the charging apparatus according to the invention there are provided on a suitable support a rectangular or polygonal bearing for holding a similarly shaped head on the contact spindle, and a spring support insulated from the bearing for the other end of the spindle. The bearing and support are each connected with one pole of the supply circuit. When the lamp or other device is placed in position, the spindle is held in the bearing so that it cannot rotate, and the charging position, in which the ends of the spindle are connected with the terminals of the accumulator, is obtained by turning the lamp or other device.

The contact spindle is mounted in a sleeve in the casing of the lamp or contact device. At its head it has a longitudinally displaceable bolt engaging in a recess in the sleeve which prevents the spindle being turned into the charging position until the bolt is withdrawn. The withdrawal of the bolt is effected by the bearing for the head of the spindle being magnetised, so that when the head is placed in the bearing the bolt is attracted and withdrawn from the recess. The bearing can be made from a steel magnet (permanent magnet) but on account of the greater strength of the magnet is preferably made as the armature or part of the armature of an electromagnet.

In the arrangement in series a number of bearings and supports are provided, the bearing of one pair being connected to the support of the next pair so that the charging current may pass through the whole series of accumulators. If an accumulator with head lamp is to be charged, the accumulator which is connected by a cable with the lamp may be placed in an insulated carrier or holder provided on the frame which carries the bearing of the spring support.

The invention is illustrated by way of example in the accompanying drawings in which a charging apparatus for accumulators with head lamps is shown.

Figure 1 shows a front elevation, Figure 2 a side elevation, and Figure 3 is a plan of the charging apparatus with accumulator and lamp.

Figure 4 shows the arrangement in series on the frame-work.

Figures 5 and 6 show examples of circuits for the magnet and the charging circuit.

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Figure 7 is a side elevation of the lamp in section.

Figure 8 is a plan view after removing the fastening ring with glass disc and the abutment member and the carrying plate.

Figure 9 is a plan of the lamp after removing the fastening ring and the glass plate and also shows the accumulator belonging to the lamp.

Figures 10, 11, 12 and 13, show the switch spindle in different positions with appropriate circuit diagrams.

On a bar 1 are angle pieces 2 to which insulated carriers 3 and 4 are attached. The carrier 3 holds a casing 5 in which the accumulator 6 can be pushed from the front. On the carrier 4 the actual charging apparatus is provided. It consists first of a magnet 7 with the bearing 13 and a contact spring 8. The magnet winding is in a housing 9 which is closed in front by means of a cover 10 and a screw 11. The magnet has a core 12 which, at the right hand side in Figure 1, forms a rectangular polygonal bearing 13. A spring 14 is secured to this. The springs 8 and 14 are similar to one another and have recesses 15.

In the bearing 13 and in the recess 15 of the spring 8, the switch spindle 16 of the lamp 17 is held so that it cannot rotate. The lamp consists of the lamp casing 31 (Figs. 7-10) in the shape of a hollow hemisphere of insulating material, on which a screw-threaded tubular extension 31a, is provided at the back. The switch spindle 16 is rotatably mounted in the lamp casing; on the spindle there are conducting projections 28, 32, 33. The projection 28 is conductively connected through a metal pin 29, with a conical metal hood 27, at one end of the switch spindle 16 of insulating material (Fig. 13). A bush 22 is vulcanised into the lamp casing 31. The bush has a curved slot 30, as shown in Figs. 10-13. The switch spindle has at the left hand end (Fig. 9), a metallic ring 84 secured to it which gives contact with the bush 22 fixed to the lamp casing 31. In the polygonal head 18 which is rigid with the switch spindle 16 there is provided a bolt 21, which under the pressure of a spring 20 engages in the curved slot 30. The outer covering 19 of the head 18 of the switch spindle is of conducting material. On the bush 22 is an extension in which is screwed the screw 23 (Fig. 9).

The cable 36 with the conductors 25, 35, is led into the interior of the lamp through the tubular extension 31a, of the lamp casing and is secured by the member 37.

The conductor 25 is connected to a screw 38, to which a spring 26 is

secured. By means of the screw 38c the springs 39 and 39a are secured to the lamp casing. These springs may be in one piece, as may the springs 40 and 40a, which are secured to the lamp casing 31 by means of the screw 38b. The springs 39a and 40a bear against the terminals of lamps 41, and press against them.

The conductor 35 is connected to a screw 56, to which also a conductor 24 leading to the screw 23 on the bushing 22 is secured. The screws 56 and 42 at the same time secure a member 43 to the lower interior part of the lamp casing. The screw 42 also holds tightly an abutment piece 44. On the part 43 is provided a pin 45 about which a plate 46 with the sockets 51 is rotatable. The part 46 has two finger like extensions 46a (Figs. 7 and 9), which when the springs 39a and 40a exert a pressure on the lamp 41, lie at a small distance over the springs 39 and 40. At the front opening of the lamp casing 31 is the reflector 47 and the glass 48. Both are secured by the fastening ring 49 which is screwed on. The reflector 47 has two circular openings 51 and can be removed when the lamp 41 is screwed out. At the rear end of the lamp casing a flap 53 is rotatably secured to a pin 52. This engages with a finger 53a over the fastening ring 49 and can be secured to the lamp casing by means of the screw 54, which is only releasable by means of a special key, in such a manner that it is not possible for the miner to unscrew the holder ring 49. The hooks 55 for hanging the lamp onto the miner's cap, are also mounted on the closing flap 53.

If the lamp 41 receives a shock, which is dangerous for it (perhaps causing the protecting glass or the incandescent member to be broken) the springs 39a and 40a owing to the inertia of the lamp yield. The part 46 swings about the pin 45 and the finger like projections 46a of the plates touch the springs 39 and 40. When one of the two lamps is switched on, this gives a short circuit as will be seen from the circuit diagram of Figs. 10 and 11, which melts the fuse provided in the lamp or the battery. It is, therefore, impossible for gases to be ignited by the breakage of the lamp.

Figs. 10-13 show the different positions of the switch spindle 16 and for the sake of clearness sections are shown on the right from which the positions of the contact pieces 28, 32, 33 are clear. On the left, sections on the line d-d (Fig. 9) are shown in order to give the appropriate positions of the bolt 21.

In Fig. 10 the conducting projection 33 of the switch spindle connects the

spring 26 with the spring 40; the lamp 41b is thus switched on. In Fig. 11 the projection 32 connects the spring 26 with the spring 39; the lamp 41a is now switched on. When the switch spindle is given a further quarter turn the position is reached, in which no projections make contact with springs; in Fig. 12, therefore, all are switched off. When the lamp is used by a miner, it is switched on and off by simply turning the head of the switch spindle. If it is desired to charge the battery 6 belonging to the lamp, at the other end of the cable 36, first a strong magnet must be held to the head 18 of the switch spindle so that the bolt 21 is drawn out of the curved slot 30. After a further quarter turn (see Fig. 13) the contact piece 28 comes into contact with the spring 26. The conductor 35, that is one pole of the battery 6 is conductively connected through the conducting piece and the like 34, with the conducting coating 19 of the head 18 at the left hand end of the switch spindle. In the position of the switch, shown in Fig. 13, the conductor 25, that is the other pole of the battery is connected through the spring 26, contact piece 28, pin 29, with the cap 27, at the right hand end of the switch spindle. According to Fig. 13, therefore, the battery 6 belonging to the lamp can be charged by applying the charging leads to the two ends of the switch spindle. Charging units of the kind described may be provided in any desired number on an angle piece 2 of suitable length (Figure 4). In this way one or more series of accumulators may be charged simultaneously. In order to simplify the construction and to save space with the arrangement in series the magnet of one charging place is, as described, constructed together with the spring of the next charging unit in such a manner that the magnet core 12 or the mount 13 is connected with the adjacent spring 14.

Figures 5 and 6, show circuit arrangements for the magnetising and charging currents. The accumulator shown in the middle of the Figures is the accumulator 6, to be charged, which is in conductive connection through the contacts at the ends of the switch spindle of the lamp, which is not shown here, on one side with the rectangular or polygonal magnet pole and on the other side with the spring. As shown in Fig. 5, the windings which are not connected conductively with their magnet cores are attached in parallel to a second circuit which only supplies the magnet windings. The first circuit goes from the switch through the first spring directly to the magnet pole through the

lamp supporting structures and the accumulator to the second spring and so on. Finally there is the possibility, according to Fig. 6, of providing a second source of current for the magnet windings in series. Which circuit should be used in a given case thus depends on the existing circumstances.

Although the invention has been described with reference to an accumulator connected with a miner's head lamp, it can of course be applied to an accumulator which is connected with any device incorporating a contact spindle and the necessary brushes to make contact with the spindle.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A charging apparatus for electrical accumulators in which the accumulator is connected to a device, for instance a miner's head lamp, including a rotatable contact spindle the ends of which form the poles for the application of a charging current, and which can be turned relatively to the device into a position in which it permits the passage of current from the poles to the accumulator, characterised by the provision on a suitable support of a rectangular or polygonal bearing for holding a head of the same shape on the contact spindle, and a spring support, insulated from the bearing, for the other end of the spindle, the bearing and support each being attached to one pole of the supply circuit and being connected through the spindle with the accumulator when the lamp or other device is turned, the spindle being held stationary in its bearing.

2. A charging apparatus as claimed in claim 1, in which a bolt carried in the head of the spindle and engaging in a recess in a sleeve carrying the spindle prevents rotation of the contact spindle into the charging position, and the rectangular or polygonal bearing is magnetised, so that when the head of the spindle is placed in the bearing, the bolt is attracted and withdrawn from the recess and allows relative rotation of the lamp or other device and the spindle into the charging position.

3. A charging apparatus for electrical accumulators as claimed in claims 1 and 2 in which the bearing for the head of the contact spindle is part of the core of an electro-magnet.

4. A charging apparatus for electrical accumulators in which a number of arrangements as claimed in claim 1 or 2 are connected in series, the bearing for

, the head of a contact spindle being electrically connected to the spring support for the end of the next contact spindle.

5. A charging apparatus for electrical accumulators as claimed in claim 4 having magnetised bearings for the heads of the contact spindles, each of which is attached to the magnet and the spring support for the end of the next contact spindle to form a single removable member.

6. A charging apparatus as claimed in claim 1 for accumulators which are

electrically attached to headlamps by cables, in which an insulated carrier for the accumulator is arranged below the place where the lamp is attached, the lamp with the contact spindle being held between a bearing and a spring support so as to be rotatable.

7. The improved charging apparatus for electrical accumulators substantially as described with reference to the accompanying drawings.

Dated this 29th day of April, 1930.

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Fig.1

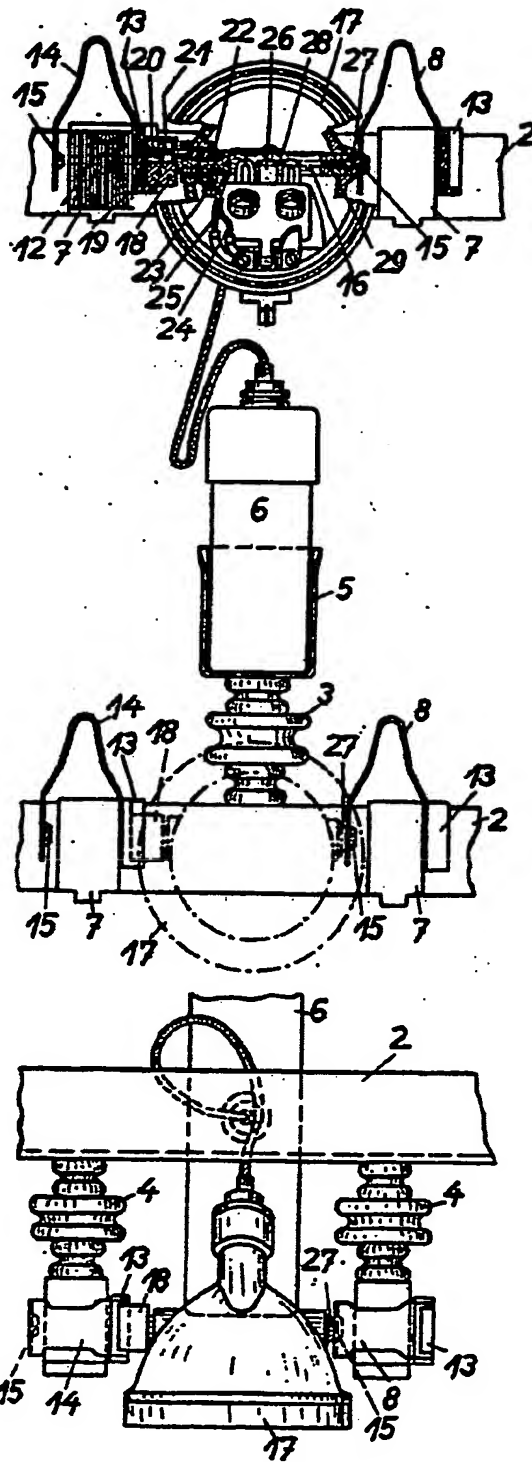


Fig.2

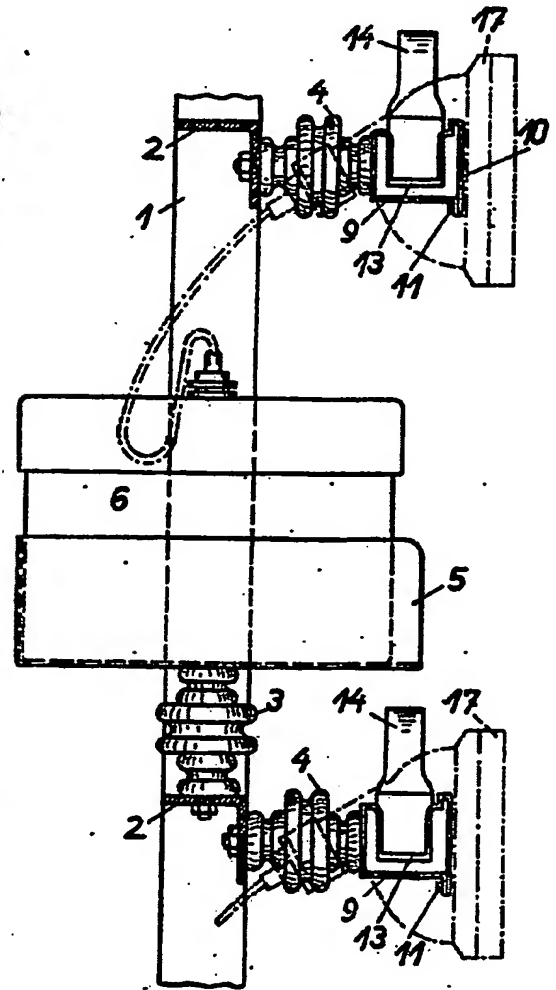
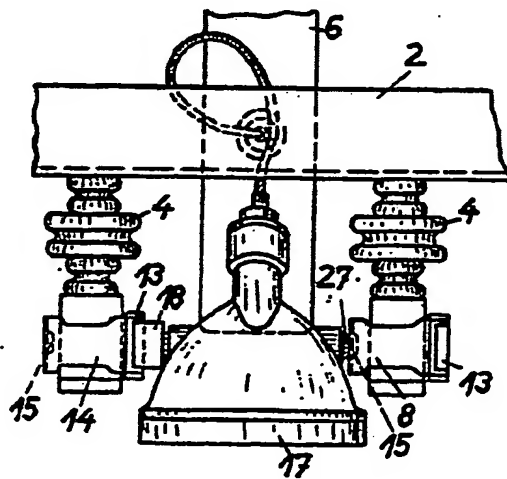
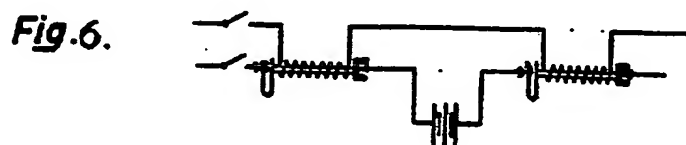
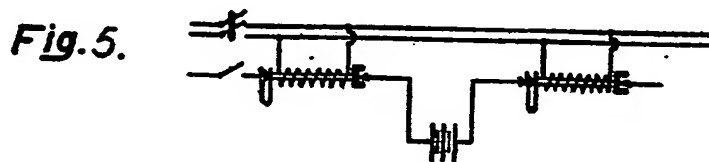
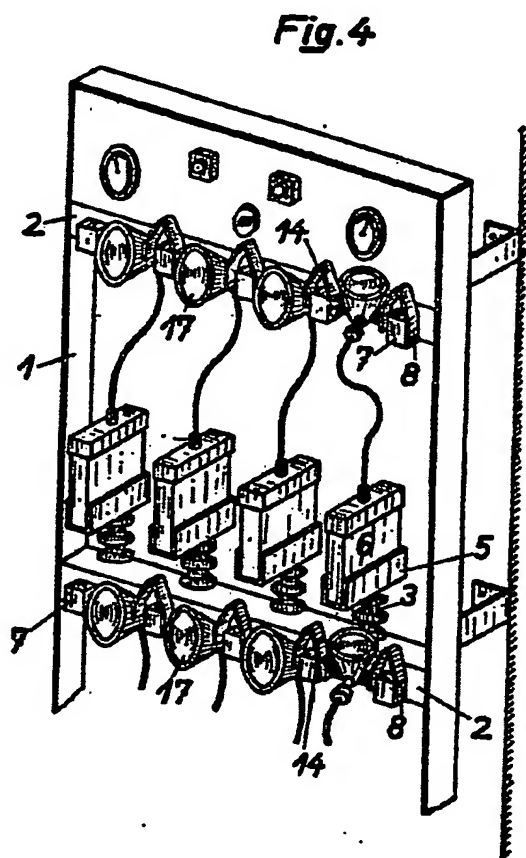
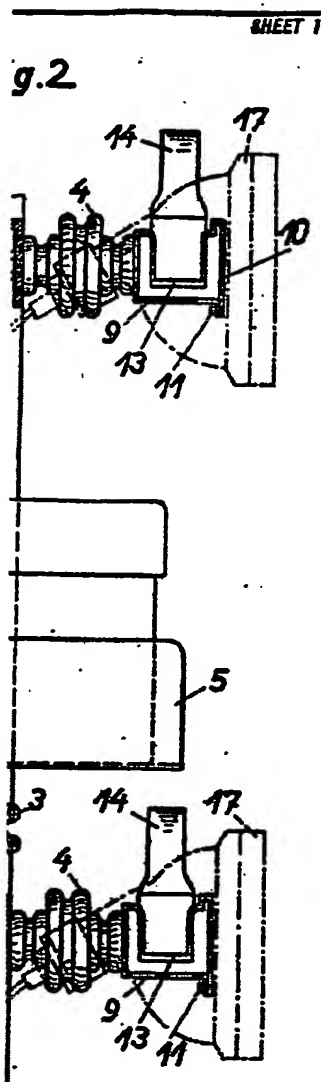


Fig.3



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Fig. 1

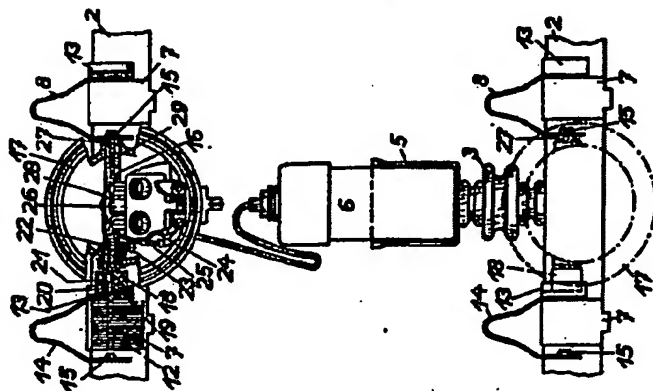


Fig. 2

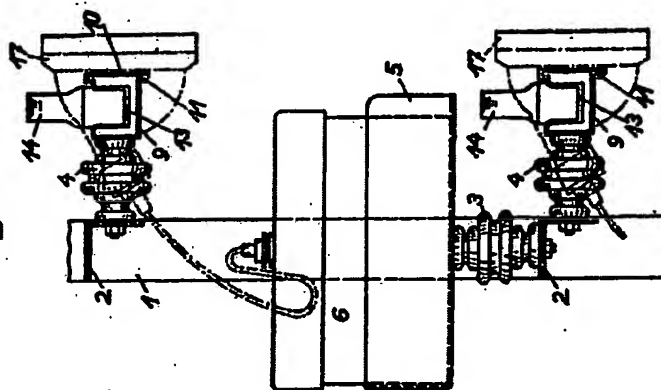


Fig. 3

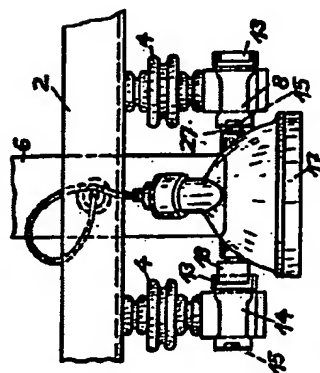


Fig. 4

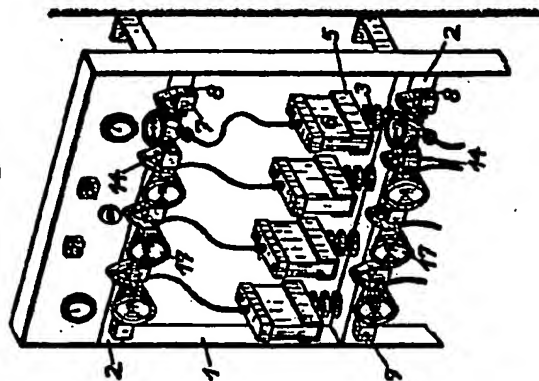


Fig. 5.

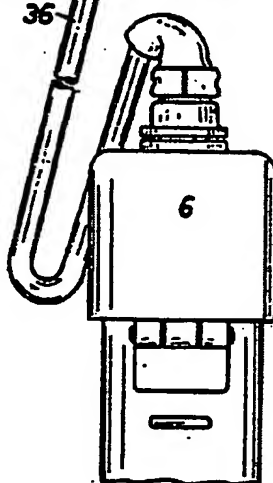
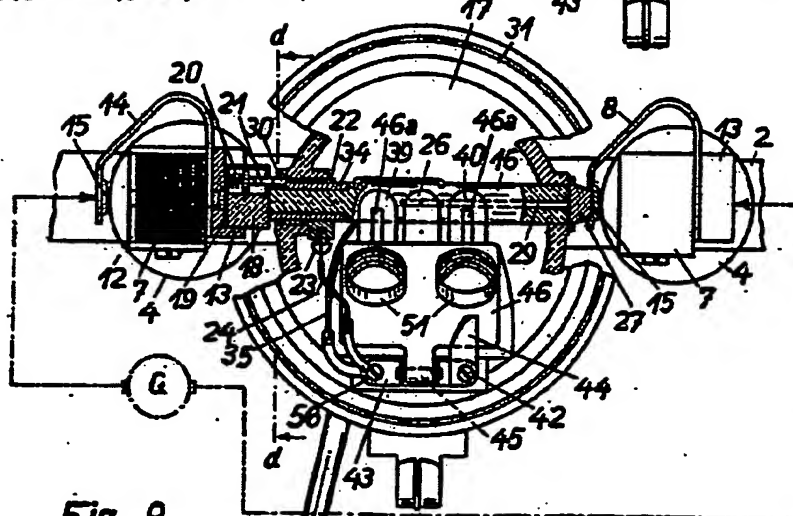
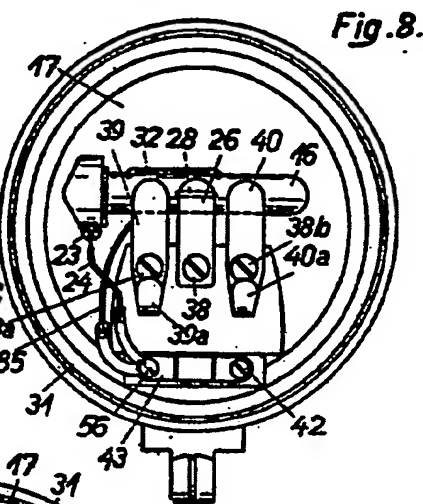
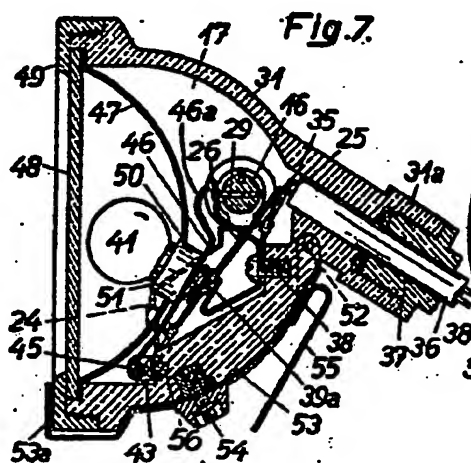


Fig. 6.



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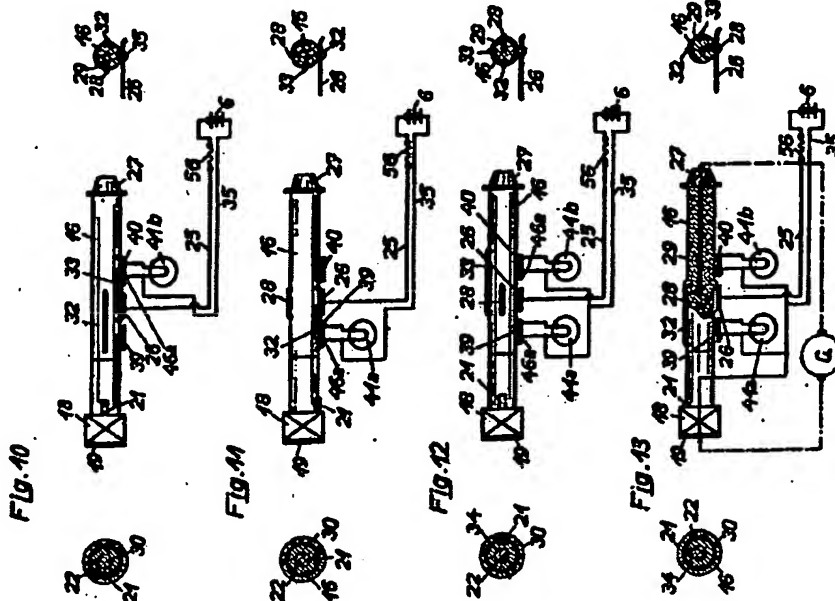
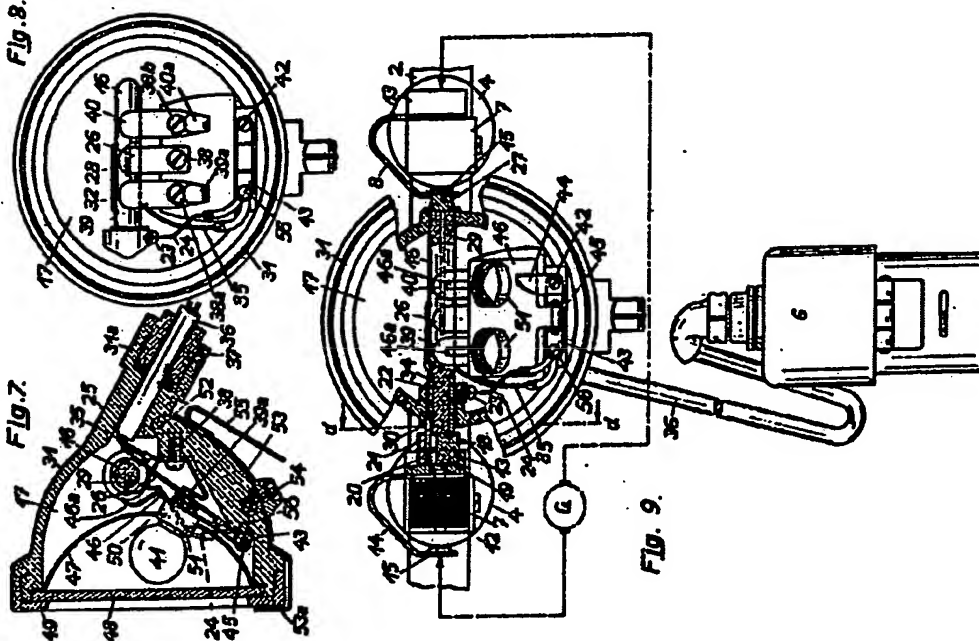
22  
16

22

34  
16



*(This Drawing is a reproduction of the Original on a reduced scale.)*



SHEET 3

1 SHEET 8  
SHEET 4

Fig. 8.

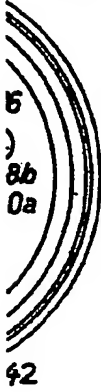


Fig. 10

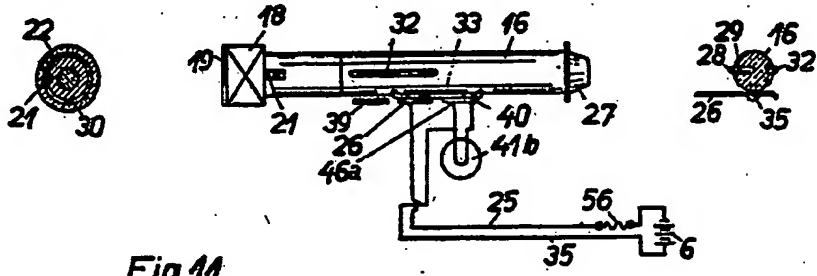


Fig. 11

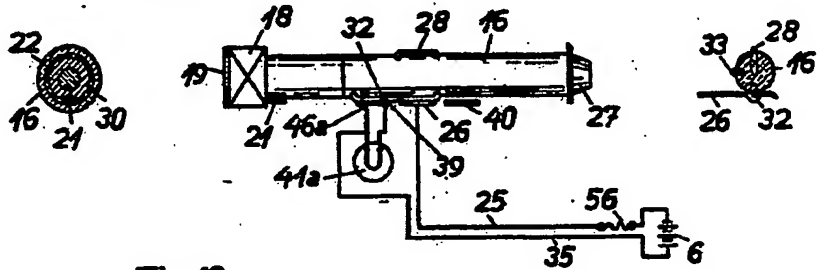


Fig. 12

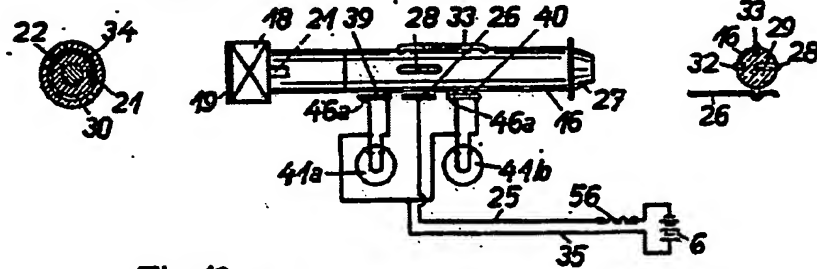


Fig. 13

